

R E M A R K S

At the middle of page 3 in the Office Action (Restriction Requirement) of October 23, 2002, Species I and II of (elected) Group I were set forth as follows:

"Species I as evidenced by claim 1.

Species II as evidenced by claims 2 to 29."

It is respectfully submitted that Species I should have included claims 3, 6 to 8 and 10 to 29, in addition to claim 1. Original claims 3, 6, 7, 10, 12 to 15, 17 to 21, 23 and 25 to 29 depended on claims 1 and 2. Claims 8, 11, 16, 22 and 24 depend on these claims that depended on claims 1 or 2.

Claims 10, 12 to 15, 17 to 21, 23, 25 and 27 were amended hereinabove to depend on only claim 1.

If claim 1 is allowed, it is respectfully requested that claims 10, 12 to 15, 17 to 21, 23, 25 and 27 also be allowed.

Claim 1 was amended to include the features of claims 3, 6, 7, 9, 26, 28 and 29.

Claims 8, 10 to 25, 27 and 70 to 72 depend directly or indirectly on claim 1.

With respect of Rule 116, entry of the above amendments is requested, since the amendments to claim 1 include features that were set forth in the claims prior to the Final Rejection, and the other amendments serve to comply with the second paragraph on page 2 of the Office Action.

The presently claimed invention concerns a method for metal smelting comprising:

(A1) preliminarily reducing at least one mixture of raw materials in a prereduction furnace to attain an average metallization degree of from 5 to 55% for iron oxide and/or iron hydroxide, the mixture of raw materials being selected from the group consisting of

(a) a mixture of raw materials prepared by mixing at least a carbonaceous material and an iron oxide and/or an iron hydroxide,

(b) a mixture of raw materials prepared by mixing and granulating at least a carbonaceous material and an iron oxide and/or an iron hydroxide, and

(c) a mixture of raw materials prepared by mixing and molding at least a carbonaceous material and an iron oxide and/or an iron hydroxide; and

(B1) melting and finally reducing the mixture of raw materials, which is preliminarily reduced in the (A1), by charging the mixture of raw materials to a smelting reduction furnace using the carbonaceous material as a reducing agent, and using combustion heat of the carbonaceous material and combustion heat of carbon monoxide generated in the smelting reduction furnace as a main heat source. In the presently claimed invention, the mixture of raw materials discharged from the prereduction furnace after being preliminarily reduced is introduced to a non-open type vessel or a pneumatic conveying unit that is operated by a non-oxidizing gas as a pneumatic conveying gas. The preliminarily reduced mixture is transferred to the smelting reduction furnace using the non-open type vessel or the pneumatic conveying unit while maintaining the mixture at a temperature of 600°C or greater and then is charged to the smelting reduction furnace. See page 66, line 8 to page 67, line 11 of the specification.

Claims 1 and 70 were rejected under 35 USC 103 as being unpatentable over Kundrat et al. USP 5,702,502 for the reasons set forth on pages 2 and 3 of the Office Action.

It was admitted in the Office Action that Kundrat et al. do not explicitly disclose an "average metallization degree of from 5 to 50% for metal (iron) oxide and/or metal (iron) hydroxide."

Kundrat et al. USP 5,702,502 relates to a three-stage process for smelting and refining chromite ore to obtain chromium units during the manufacturing of stainless steel (see column 1, lines 6 to 8 of Kundrat et al.). In contrast thereto, the presently claimed invention relates to a metal smelting of iron ore containing iron oxide and/or iron hydroxide (see applicants' claim 1).

The object of Kundrat et al. is to produce inexpensive metallic Cr units from an inexpensive chemical grade raw chromite material ore or concentrate, whereas it is an object of the present invention to provide a method for metal smelting that can manufacture molten iron with a high production efficiency of the total process and a high productivity by melt-reducing an iron oxide and/or an iron hydroxide, such as iron ore. Kundrat et al. does not teach or suggest the production efficiency of the total process as achieved by the presently claimed invention.

Kundrat et al. do not refer to the relationship between the metallization degree of semi-reduced iron and energy consumption which is shown in applicants' Fig. 4.

Claims 1, 70, 71 and 72 were rejected under 35 USC 103 as being unpatentable over WO 99/16911 for the reasons set forth at the top of page 4 of the Office Action.

With respect to the presently claimed feature involving the conditions for transfer of the mixture of raw materials from the prereduction furnace to the smelting reduction furnace, Kundrat et al. USP 5,702,502 and WO 99/16911 do not teach or suggest the following:

(A) the preliminarily reduced mixture is introduced to a non-open type vessel or a pneumatic conveying unit; and

(B) the preliminarily reduced mixture is maintained at a temperature of 600°C or greater.

The presently claimed invention has an advantage of successfully minimizing the energy loss caused by the temperature decrease and the re-oxidization of the preliminarily reduced mixture.

Regarding the presently claimed feature of an additional carbonaceous material, Kundrat et al. USP 5,702,502 and WO 99/16911 do not employ a mixture of raw materials and an additional carbonaceous material.

In the presently claimed invention, a mixture of raw materials including a carbonaceous material and an iron oxide and/or an iron hydroxide is preliminarily reduced in a prereduction furnace. Moreover, an additional carbonaceous material, other than the carbonaceous material contained in the mixture of raw materials, is charged to the smelting reduction furnace. Namely, the mixture of raw materials is prereduced in the prereduction furnace and the additional carbonaceous material is charged to the smelting reduction furnace.

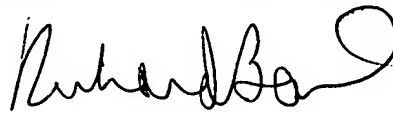
Accordingly, gas is generated in a stable state from the smelting reduction furnace, since the amount of gas relates to the amount of carbonaceous material being charged to the smelting reduction furnace (see page 70, lines 19 to 27 of the specification).

It is therefore respectfully submitted that applicants' claimed invention is not rendered obvious by the references.

Reconsideration is requested. Allowance is solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,



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